

What is claimed is:

1. A conductor component for a motor, the motor including a magnet component, the magnet component including a magnet that is surrounded by a magnetic field, the conductor component comprising:

5 a motor drive conductor array that generates a drive magnetic field and a stray magnetic field when electrical current is directed through the motor drive conductor array, the drive magnetic field interacting with the magnetic field of the magnet to generate a reactive force; and

10 an auxiliary conductor array that generates an auxiliary magnetic field that interacts with the stray magnetic field and reduces the stray magnetic field.

2. The conductor component of claim 1 wherein the auxiliary conductor array generates the auxiliary magnetic field when electrical current is directed through the auxiliary conductor array.

15 3. The conductor component of claim 1 wherein the auxiliary magnetic field has substantially no influence on the position of the conductor component relative to the magnet component.

4. The conductor component of claim 1 wherein the auxiliary conductor array substantially encircles the motor drive conductor array.

20 5. The conductor component of claim 4 wherein the auxiliary conductor array includes a plurality of auxiliary coils that each encircle the perimeter of motor drive conductor array.

6. The conductor component of claim 4 wherein the motor drive conductor array includes an odd number of poles.

7. The conductor component of claim 4 wherein the auxiliary conductor array includes a left transverse segment and a right transverse segment that is spaced apart from the left transverse segment, wherein when a current is directed through the auxiliary conductor array, the left transverse segment generates a force that is substantially equal and oppose to force generated by the right transverse segment.

8. The conductor component of claim 1 wherein the auxiliary conductor array includes a pair of spaced apart auxiliary coil sets.

9. The conductor component of claim 1 wherein the auxiliary conductor array includes an upper longitudinal coil set, a lower longitudinal coil set, a left transverse coil set and a right transverse coil set that cooperate to substantially encircle the perimeter of the motor drive conductor array.

10. The conductor component of claim 9 wherein the motor drive conductor array includes an even number of poles.

11. The conductor component of claim 1 wherein the auxiliary conductor array includes a left transverse coil set and a right transverse coil set and wherein when a current is directed through the left transverse coil set and the right transverse coil set, the left transverse coil set generates a force that is substantially equal and oppose to a force generated by the right transverse coil set.

12. The conductor component of claim 1 further comprising a conductor housing that retains the motor drive conductor array and the auxiliary conductor array.

13. The conductor component of claim 1 wherein the conductor housing includes a conductor section that retains the motor drive conductor array and the auxiliary conductor array.

14. The conductor component of claim 1 wherein the auxiliary conductor array reduces the stray magnetic field a factor of at least approximately 100.

15. A linear motor including the conductor component of claim 1 and a magnet component including a magnet that is surrounded by a magnetic field.

5 16. The linear motor of claim 15 wherein the magnet component includes a pair of spaced apart magnet arrays and the motor drive conductor component is positioned between the magnet arrays.

17. The linear motor of claim 16 wherein the auxiliary conductor component is positioned between the magnet arrays.

10 18. A stage assembly including the linear motor of claim 15.

19. An exposure apparatus including the linear motor of claim 15.

20. An object on which an image has been formed by the exposure apparatus of claim 19.

15 21. A semiconductor wafer on which an image has been formed by the exposure apparatus of claim 19.

22. The exposure apparatus of claim 19 including an illumination source that generates an electronic beam.

23. A brushless electric motor comprising:
a magnet component including a plurality of magnets, each of the
magnets being surrounded by a magnetic field;

5 a conductor component that includes a motor drive conductor array,
the motor drive conductor array generating a drive magnetic field and a
stray magnetic field when electrical current is directed through the motor
drive conductor array, the drive magnetic field interacting with the magnetic
fields of the magnets to generate a reactive force that is used to move one
of the components relative to the other component; and

10 an auxiliary conductor array that generates an auxiliary magnetic
field that interacts with the stray magnetic field and reduces the stray
magnetic field.

24. The motor of claim 23 wherein the auxiliary conductor array
generates the auxiliary magnetic field when electrical current is directed through
15 the auxiliary conductor array.

25. The motor of claim 23 wherein the auxiliary magnetic field has
substantially no influence on the position of the conductor component relative to
the magnet component.

26. The motor of claim 23 wherein the auxiliary conductor array
substantially encircles the motor drive conductor array.
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27. The motor of claim 26 wherein the auxiliary conductor array includes
a plurality of auxiliary coils that each encircle the motor drive conductor array.

28. The motor of claim 26 wherein the motor drive conductor array
includes an odd number of poles.

29. The motor of claim 26 wherein the auxiliary conductor array includes a left transverse segment and a right transverse segment that is spaced apart from the left transverse segment, wherein when a current is directed through the auxiliary conductor array, the left transverse segment generates a force that is substantially equal and oppose to a force generated by the right transverse segment.

30. The motor of claim 23 wherein the auxiliary conductor array includes a pair of spaced apart auxiliary coil sets.

31. The motor of claim 23 wherein the auxiliary conductor array includes an upper longitudinal coil set, a lower longitudinal coil set, a left transverse coil set and a right transverse coil set that cooperate to substantially encircle the motor drive conductor array.

32. The motor of claim 31 wherein the motor drive conductor array includes an even number of poles.

33. The motor of claim 23 wherein the auxiliary conductor array includes a left transverse coil set and a right transverse coil set and wherein when a current is directed through the left transverse coil set and the right transverse coil set, the left transverse coil set generates a force that is substantially equal and oppose to a force generated by the right transverse coil set.

34. The motor of claim 23 wherein the conductor component includes a conductor housing that retains the motor drive conductor array and the auxiliary conductor array positioned near the motor drive conductor array.

35. The motor of claim 23 wherein the conductor housing includes a conductor section that retains the motor drive conductor array and the auxiliary conductor array.

36. The motor of claim 23 wherein the auxiliary conductor array reduces the stray magnetic field a factor of at least approximately 100.

37. The motor of claim 23 wherein the magnet component includes a pair of spaced apart magnet arrays and the motor drive conductor component is positioned between the magnet arrays.

38. The motor of claim 37 wherein the auxiliary conductor component is positioned between the magnet arrays.

39. A stage assembly including the linear motor of claim 23.

40. An exposure apparatus including the linear motor of claim 23.

41. An object on which an image has been formed by the exposure apparatus of claim 40.

42. A semiconductor wafer on which an image has been formed by the exposure apparatus of claim 40.

43. The exposure apparatus of claim 40 including an illumination source that generates an electronic beam.

~~44.~~ A method for manufacturing a brushless electric motor, the method comprising the steps of:

providing a magnet component including a plurality of magnets, each of the magnets being surrounded by a magnetic field;

providing a conductor component that includes a motor drive conductor array, the motor drive conductor array generating a drive magnetic field and a stray magnetic field when electrical current is directed through the motor drive conductor array, the drive magnetic field interacting with the magnetic fields of the magnets to generate a reactive force that is used to move one of the components relative to the other component; and

providing an auxiliary conductor array that generates an auxiliary magnetic field that interacts with the stray magnetic field and reduces the stray magnetic field.

45. The method of claim 44 wherein the step of providing an auxiliary conductor array that generates an auxiliary magnetic field includes the step of directing electrical current through the auxiliary conductor array.

46. The method of claim 44 wherein the step of providing an auxiliary conductor array includes providing an auxiliary conductor array that substantially encircles the motor drive conductor array.

47. The method of claim 44 wherein the step of providing an auxiliary conductor array includes providing an auxiliary coil that includes a left transverse segment and a right transverse segment that is spaced apart from the left transverse segment, wherein when a current is directed through the auxiliary conductor array, the left transverse segment generates a force that is substantially equal and oppose to a force generated by the right transverse segment.

48. The method of claim 44 wherein the step of providing an auxiliary conductor array includes providing a pair of spaced apart auxiliary coil sets.

49. The method of claim 44 wherein the step of providing an auxiliary conductor array includes providing an upper longitudinal coil set, a lower longitudinal coil set, a left transverse coil set and a right transverse coil set that cooperate to substantially encircle the motor drive conductor array.

50. The method of claim 44 wherein the step of providing an auxiliary conductor array includes providing a left transverse coil set and a right transverse coil set and wherein when a current is directed through the left transverse coil set and the right transverse coil set, the left transverse coil set generates a force that is substantially equal and oppose to a force generated by the right transverse coil set.

51. The method of claim 44 wherein the step of providing the conductor component includes the step of providing a conductor housing that retains the motor drive conductor array and the auxiliary conductor array positioned near the motor drive conductor array.

5 52. The method of claim 44 wherein the step of providing a magnet component includes providing a pair of spaced apart magnet arrays and the motor drive conductor component is positioned between the magnet arrays.

53. The method of claim 52 including the step of positioning the auxiliary conductor component between the magnet arrays.

10 54. A method for manufacturing a stage assembly that moves a stage, the method comprising the steps of providing a motor manufactured by the method of claim 44 and connecting the motor to the stage.

15 55. A method for making an exposure apparatus that forms an image formed on a first object on a second object, the method comprising the steps of:
providing an illumination system that illuminates the first object supported by a first stage to form the image on the second object; and
connecting the motor manufactured by the method of claim 44 to the first stage as a driving force for moving the first object.

20 56. A method for making a device utilizing the exposure apparatus made by the method of claim 55.

57. A method for making a semiconductor wafer utilizing the exposure apparatus made by the method of claim 55.

25 58. The method of claim 55 wherein the step of providing an illumination system includes the step of providing an illumination source that generates an electronic beam.

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A brushless electric motor comprising:

a magnet component including a plurality of magnets and

a conductor component that includes a motor drive conductor array,

the motor drive conductor array generating a drive magnetic field and a
stray magnetic field when electrical current is directed through the motor
drive conductor array, the drive magnetic field interacting with the magnetic
fields of the magnets to generate a reactive force that is used to move one
of the components relative to the other component, characterized in that
said the motor array comprises 2^n motor drive conductors, where n is any
positive integer.

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